Defining Clinical Condition Categories for Biosurveillance

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Objective

- To create a set of clinical condition categories based on explicit criteria for use in aggregating chief complaints and coded diagnosis data in biosurveillance programs.

Background

- ESSENCE and BioSense currently aggregate ICD-9-CM diagnosis data and chief complaint free text into 11 broad syndromes groups[1], namely botulism-like, hemorrhagic Illness, lymphadenitis, localized cutaneous lesion, gastrointestinal, respiratory, neurological, rash, specific infection, fever, and severe illness or death.
- Biosurveillance programs have also created diverse sets of more granular clinical condition categories (called "sub-syndromes" in the BioSense and ESSENCE programs). These sub-syndromes
  - Are more granular than syndromes
  - cover a broader range of conditions then typical syndromic surveillance (e.g., injuries, chronic disease)
- Different biosurveillance systems use different clinical condition categories, even for the same syndrome.

Example: Current Respiratory Syndrome in BioSense and ESSENCE

BioSense	ESSENCE D
Asthma	Apnea
Bronchitis & Bronchiolitis	Asthma
Chest pain	
Cough	Congestion
	Cough
Dyspnea	Croup
Cyanosis & Hypoxemia	Difficulty breathing
Hemoptysis	Hypoxia
Influenza-like Illness	
Otitis media	Otitis media
	Pharyngitis
Pleurisy	Pleurisy
Pneumonia & Lung Abscess	Pneumonia
	Respiratory distress
Respiratory failure	Respiratory failure
RSV	
	Sinusitis
Upper respiratory infection	Upper respiratory infection
	Wheezing

[1]Centers for Disease Control and Prevention. "Syndrome Definitions for Diseases Associated with Critical Bioterrorism-associated Agents" October 23, 2003. http://www.bt.cdc.gov/surveillance/syndromedef/ accessed May 8, 2007.

[2]Hurricane Morbidity Report Form: For Active Surveillance in Clinical Care Settings" http://www.bt.cdc.gov/disasters/hurricanes/asccs.asp, accessed May 11, 2007."

- Motivation for Defining a Common Set of Clinical Condition Categories
  - Clinical condition categories (e.g., dyspnea) are more easily defined than syndromes (e.g., respiratory syndrome)
  - Facilitate creation of case definitions and ad hoc queries (e.g., headache OR stiff neck OR fever for a meningitis outbreak)
  - Using a common set of clinical condition categories will allow more consistency in interpretation of results from diverse biosurveillance systems while allowing each system to build their own unique syndromes and queries.

Methods

1. Identify Surveillance Functions to Support

A. Support syndromes used in BioSense and ESSENCE

B. Support counter-bioterrorism surveillance

C. Support nationally notifiable disease surveillance

D. Support CDC recommendations for post-disaster surveillance[2]

2. Generate Set of Symptoms, Signs, Illnesses

Example:

Conditions of Interest	Symptom/Sign/Illness
Respiratory Syndrome	cough stidor shortness of breath throat pain
Anthrax (inhalational)	chest discomfort cough fatigue fever ILI malaise myalgia rhonchi shortness of breath sore throat
Post-Disaster Surveillance	acute respiratory infx conjunctitis

3. Aggregate Conditions and Assign SNOMED-CT Term

- Principle: Utility as a distinct category
  - Appropriate level of granularity
  - Appropriate for chief complaint free text and ICD-9-CM diagnosis codes

Example:

Conditions of Interest	Symptom/Sign/Illness	Clinical Condition Classifier
Respiratory Syndrome	cough stidor* shortness of breath* throat pain	Cough Dyspnea* Sore Throat Chest Pain ILI Malaise & Fatigue Fever Myalgia Conjunctivitis
Anthrax (inhalational)	chest discomfort cough fatigue fever ILI malaise myalgia rhonchi* shortness of breath* sore throat	
Post-Disaster Surveillance	acute respiratory sxs conjunctitis	

4. Develop Text Definition, Key Words, ICD-9 List for Clinical Condition Categories

Example:

Text definition for respiratory failure:

- Respiratory function fails to maintain adequate oxygen supply and carbon dioxide removal (UMLS)
- Includes: cyanosis, respiratory distress syndrome, respiratory insufficiency, hypoxemia, asphyxia, respiratory arrest, apnea, pulmonary edema
- Does not include: chronic respiratory failure, respiratory failure of newborn, respiratory failure due to surgery or trauma, sleep apnea, pulmonary edema related to heart failure

Results

- Developed criteria and process for selection of clinical condition categories
- Applied criteria to generate:
  - 73 conditions of interest
  - 629 associated symptom/sign/illness
  - 79 clinical condition categories

Draft Clinicial Condition Categories

Respiratory (11)
acute bronchitis
asthma
chest pain
cough
dyspnea
hemoptysis
influenza-like illness
pneumonia
respiratory failure
sore throat symptom
upper respiratory infection

Gastrointestinal (7)
abdominal pain
diarrhea
food poisoning
gastrointestinal hemorrhage
hepatitis
infectious enteritis
nausea and vomiting

Injury (17)
abrasion/contusion/crushing injury
accidental poisoning
animal bite
assault/injury NOS
burn
dislocations/sprains/strains
drowning/pulmonary aspiration of
effects of heat
exposure to carbon monoxide
fall
fracture of bone
hypothermia
injury NOS
laceration/stab wound
motor vehicle accident
non-fatal electric shock
retained foreign body in eye

Neurological (14)
altered mental status
coma
cranial nerve disorder
dizziness
dysphagia
headache
meningoencephalitis
muscle spasm
numbness
paralysis
photophobia
psychomotor agitation
seizure
stiff neck

Constitutional (6)
headache
anorexia
dehydration
fever
malaise and fatigue
myalgia

Chronic Disease (3)
chronic disease of cardiovascular system
diabetes mellitus
hypertension

Dermatological (6)
cellulitis
insect bite/insect sting
itching
local infection of wound
rash
skin lesion

Hemorrhagic Illness (3)
gastrointestinal hemorrhage
hemoptysis
hemorragic condition

Mental Health (4)
psychomotor agitation
acute drug intoxication/drug
psychotic disorder
suicidal

Other (12)
acute renal impairment
anemia
arthralgia
conjunctivitis
death
female reproductive system disorder
hypotension
localized edema
lymphadenopathy
medication refill
pregnancy, childbirth and puerperium
finding
septicemia

Discussion:

- The process outlined here represents a knowledge-based approach
- The selected clinical condition categories are appropriate for aggregating chief complaint and coded diagnosis
- Determining "utility as a distinct category" is subjective
- This process does not address specific infections
- This process does not address clinical conditions to exclude from classification (e.g., pregnancy, trauma)
- BioSense and ESSENCE will move towards using a common set of clinical condition categories